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AMERICA'S OPPORTUNITY IN SCIENCE.

By George W. Tidd.

WHILE the planet is shattered by the turmoil of a world war, it is well for us to take an account of the position that our country occupies in scientific achievement. There never was a time when things needed to be better done than now. To get the proper perspective is our need. We are most apt to view things as they relate immediately to our affairs. The proper relation to be sought is that of a world civilization. The war drum is heard in the centers of European scientific culture. Their laboratories are deserted by the workers for the battle front. Test tubes and culture media have been left for the bayonet thrust and carnage of battle. The hand skilled in the accuracy of measurements in the research laboratory now uses the entrenching spade, and the eye trained in spectrum determinations now sights the deadly rifle at brother scientists. Some have fallen, others languish in prison, to return at the close of the war to resume their scientific labors with weakened physical powers and faculties blunted by the scenes and terrors of battle. Never again can they have that mastery of their powers demanded by research. The bitterness of race hatred and the enmity of international strife rankle in the breasts where once flourished the spirit of scientific comraderie and coöperation. Billions of dollars are being wasted in war's destructiveness, leaving nought for the needs of scientific work.

Shall we allow the onward progress of world development to cease, or, as the leading industrial nation, assume the obligation of doing the world's intellectual and scientific work. This is America's opportunity. The horror of the European conflict is spreading a pall over the whole civilized world. A stagnation is felt in our industrial and business affairs which is gradually spreading into the intellectual pursuits. Let us arise and shake off this torpor. It will require a generation for Europe to recover from its titanic struggle. Shall we hesitate and allow the progress of civilization to be retarded for that period?

Hitherto America has been a third-rate power in scientific achievement; its opportunity is now at hand to rise to the first rank. Let us not stand appalled at the European conflict, but enter at once with greater effort in the scientific work that our hands find to do. This country needs more trained investigators, but especially it needs better facilities for their work. The call came recently for help for the starving Belgians, and America quickly responded with $10,000,000. Let the call be earnestly made for the funds that are sorely needed for the development of scientific work and it will surely be heard and adequately answered. While our government is seriously considering the advisability of additional expenditures for national defense, its attention should be called to the urgency of our scientific needs. It is said that more men are needed in our army and navy and that they should be drilled for service. A greater need is for more brilliant young men to be thoroughly trained for scientific pursuits. Throughout the length and breadth of our land a greater effort should be made to enlist able young men and women in scientific work. Not only should we encourage our own, but we should give a hearty welcome to scientific workers of other lands who, discontented with conditions there, may become interested in locating here.

The effort that is now being made by the American Association for the Advancement of Science in the greater development of research should meet with widespread approval and aid. From the very nature of their work, scientific bodies must necessarily be exclusive in character. This leads to a weakness in the lack of coöperation and understanding between these bodies and the general public. The latter is entitled to know what is being undertaken and what is being accomplished by scientists if it is expected to contribute to the support of their efforts. The general public is unable to read the reports of their work in the scientific journals. Its source of information must be the daily papers, the popular magazines, and popular lectures. Too often the articles of the popular press fail to properly present the results of scientific investigations. It is clearly the duty of scientists to reduce their results to language comprehensible by the general public and give their reports through the popular press. The writer has tried the plan of writing articles on scientific subjects in a popular form for the daily press, and has always been pleased with the demand for them.

The popular scientific lecture seems, unfortunately, to be on the decline. Too often they are given by men who are doing it for the financial rather than the scientific consideration. Scientific workers may do much to aid in the popular dissemination of scientific knowledge by giving some of their time to popular scientific lectures for the general public. The attention of public-school and college students should be frequently called to current scientific work. For years we have allowed able young men and women to be deterred from entering upon scientific research on account of lacking financial support needed to maintain them comfortably while engaged in the work. We have passed our pioneer days, and this condition does not longer need to exist. National, state and local aid should be evoked for this purpose. We have been very proud of the Carnegie Institution and the Rockefeller Institute for Scientific Research, and justly so; but far better than pausing to express our gratification at the founding of these splendid institutions and in exultation at the work they have already done, would have been to secure the founding of other similar institutions.

There is a real danger in overemphasis of the so-called practical in education, if that may be made to detract from research. The scientific work in various lines contributes to the success of other lines of investigation, so that the public should be made to know that all lines of research must be fostered. Public aid may be more readily obtained if the solution of its problems is more eagerly undertaken by scientists. A research made on the properties of the soil may lack somewhat the fascination of the pursuit of electrons, but it gives splendid opportunity for the young research worker to gain experience, and urgently needs to be done if we have and hold the full coöperation of the public. A closer relationship between the state governments and the research laboratories within their borders is important. Problems arise in the development of any section of the country that can be adequately dealt with only by the research worker. When these workers show their willingness to devote their time to such problems, and when the public realizes that results may be had from such coöperation, abundant funds will readily be furnished for the needs of research.

A pronounced decadence has taken place in the high-school sciences in the period from 1890 to 1910, inclusive, according to the report of the Commissioner of Education, 1910, vol. 2,

p. 1139. We can not hope to maintain an adequate body of scientific workers unless the study of the sciences in our public schools regains its former prestige. Scientific bodies must give due consideration to this condition and aid the educators in its improvement, or there will be too small a number of young men and women fitted to supply the ranks of the research workers in the next generation. There are a number of ways in which science may be popularized. Through the medium of scientific books written in a simple, popular style many may be reached through city libraries and in the home. Specialists should select such matter from their investigations that will possess interest for the general public and issue it in an attractive form. We must face this problem fairly. Either we must have a well-trained, thoroughly interested and alert body of young men and women from which to recruit the next generation of scientists or America must sink to a still lower rank in scientific achievement. If they live up to their responsibility at the present time it must be the policy of American scientists to press home the urgent needs upon the public mind in order that we shall step into our rightful place, the first in scientific rank, and shall carry forward the great work of civilization.

Must our college and research laboratories be longer dominated by the "Made in Germany" label? American scientists should at this time encourage home manufacture of scientific goods. If they lend their aid and advice in designing apparatus, and if our manufacturers spare no expense in the employment of the highest skilled mechanicians that the world affords, it will only be a few years until the American label will be a sufficient guaranty of the highest efficiency in scientific goods.